

FleeceBACK® TPO

Membranes



Overview

FleeceBACK TPO membranes with Octaguard XT™ are manufactured using a hot-melt extrusion process for complete scrim encapsulation. Once the TPO is reinforced and enhanced with fleece, the total sheet thicknesses available are 100, 115, and 135 mils, creating a very tough, durable and versatile sheet that is ideal for re-roofing or new construction projects. FleeceBACK TPO sheets are chlorine free and plasticizer free with excellent chemical resistance to acids, bases, restaurant oils, and greases.

All FleeceBACK TPO membranes utilize Octaguard XT™ weathering package technology to withstand extreme durability testing intended to simulate exposure to severe climates. FleeceBACK TPO's advanced polymerization technology combines the flexibility of ethylene-propylene (EP) rubber with the heat weldability of polypropylene.

FleeceBACK TPO membranes are intended to be used with adhered or mechanically fastened roofing systems. FleeceBACK TPO is ideally suited for roof garden and solar panel applications and projects demanding superior wind uplift resistance due to its added toughness and durability. FleeceBACK TPO is also a great solution for buildings requiring low noise and odors during roofing application.

Features and Benefits

- » Choice of white, gray, or tan membranes that are UL Class A rated
- » Superior wind uplift performance and ratings (up to an FM 1-945) due to a mechanical bond between fleece and adhesive
- » 75% fewer seams than Modified Bitumen
- » Wide window of weldability

- » Fleece reinforcement adds toughness, durability, and enhanced puncture resistance
 - 115-mil membrane delivers 33% greater puncture resistance and 33% greater breaking strength than 60-mil TPO
 - Greater puncture resistance than Modified Bitumen
- » Excellent hail damage resistance
 - Passes FM's severe hail test
 - Passes UL-2218 Class 4 rating
 - Passes National Bureau of Standards – 23 Ice Ball test up to 3"-diameter hail with the membrane cooled to 32°F

Installation

Adhered Roofing System

Insulation is mechanically fastened or adhered. Spray-apply or extrude FAST™ or Flexible FAST Adhesive to the substrate and allow foam to "string/body" approx 1½ - 2 minutes prior to setting FleeceBACK TPO into the FAST Adhesive. Roll FleeceBACK TPO membrane with a 30"-wide, 150-pound weighted roller to ensure full embedment. Splices are hot-air welded. End laps are butted and sealed with reinforced membrane or a head sheet may be utilized.

Review Carlisle specifications and details for complete installation information, including mechanically fastened options.

Precautions

- » Use proper stacking procedures to ensure sufficient stability.
- » Exercise caution when walking on wet membrane.
- » UV-resistant sunglasses are required when working with FleeceBACK TPO membranes.
- » White surfaces reflect heat and may become slippery due to frost and ice accumulation.
- » Care must be exercised when working close to a roof edge when the surrounding area is snow covered.
- » FleeceBACK TPO membrane rolls must be tarped and elevated to keep dry prior to installation. If the fleece gets wet, use a wet vac system to help remove moisture from the fleece. **DO NOT INSTALL MEMBRANE IF FLEECE IS WET.**
- » FleeceBACK TPO membrane exposed to the weather must be prepared with Weathered Membrane Cleaner prior to hot-air welding.

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LEED® Information

Pre-consumer Recycled Content	10%
Post-consumer Recycled Content	0%
Manufacturing Location	Senatobia, MS Tooele, UT
Solar Reflectance Index	White: 99 Gray: 53 Tan: 86

Radiative Properties for ENERGY STAR®, Cool Roof Rating Council (CRR) and LEED

Physical Property	Test Method	White	Gray	Tan
ENERGY STAR – Initial solar reflectance	Solar Spectrum Reflectometer	0.79	N/A	0.71
ENERGY STAR – Solar reflectance after 3 years	Solar Spectrum Reflectometer (uncleaned)	0.70	N/A	0.64
CRR – Initial solar reflectance	ASTM C1549	0.79	0.46	0.71
CRR – Solar reflectance after 3 years	ASTM C1549 (uncleaned)	0.70	0.43	0.64
CRR – Initial thermal emittance	ASTM C1371	0.90	0.89	0.86
CRR – Initial thermal emittance after 3 years	ASTM C1371 (uncleaned)	0.86	0.88	0.87
LEED – Thermal emittance	C1371	0.90	0.89	0.86
Solar Reflectance Index (SRI)	ASTM E1980	99	53	86

Carlisle Extreme Testing – Heat Aging

	ASTM Requirement	FleeceBACK TPO Requirement
ASTM Test 240°F	670 hours or 4 weeks	5,376 hours or 32 weeks*

*Comparable to 1,024 weeks (20 years) at 185°F for 6 hrs/day.

Heat Aging accelerates the oxidation rate that roughly doubles for each 18°F (10°C) increase in roof membrane temperature. Oxidation (reaction with oxygen) is one of the primary chemical degradation mechanisms of roofing materials.

Carlisle Extreme Testing – Environmental Cycling

–10 days heat aging at 240°F (116°C) followed by 5 days water immersion at 158°F (70°C)

Followed by 5,040 kJ/m² (2000 hrs. at 0.70 W/m² irradiance) xenon-arc exposure

Environmental Cycling subjects the membrane to repeated cycles of heat aging, hot-water immersion followed by xenon-arc exposure.

EXTREME Testing for Severe Climates

ASTM Standard D6878 is the material specification for Thermoplastic Polyolefin-Based Sheet Roofing. It covers material property requirements for TPO roof sheeting and includes initial and aged properties after heat and xenon-arc exposure. As stated in the scope of the standard, “the tests and property limits used to characterize the sheet are values intended to ensure minimum quality for the intended purpose.” Carlisle’s goal is to produce TPO that delivers maximum performance for the intended purpose of roofing membranes. Maximum performance requires the membrane to far exceed the requirements of ASTM D6878.

Typical Properties and Characteristics

Physical Property	Test Method	SPEC. (Min.)	FleeceBACK TPO Typical
Tolerance on Nominal Thickness, %	ASTM D751	±10	±10
Thickness over Fleece, min 100-mil (2.54 mm) 115-mil (2.92 mm) 135-mil (3.43 mm)	— — —	— — —	.045 (1.14) .060 (1.52) .080 (2.03)
Weight, lbm/ft² 100-mil 115-mil 135-mil	— — —	— — —	0.27 0.33 0.46
Breaking Strength, min, lbf (kN) 100-mil 115-mil 135-mil	ASTM D751 Grab Method	220 (1)	350 (1.6) 450 (2) 500 (2.2)
Elongation at break of internal fabric, %	ASTM D751	15	25
Tearing Strength, min, lbf (N) 100- & 115-mil, 135-mil	ASTM D751 B Tongue Tear	55 (245)	100 (445)
Puncture Resistance, Joules 100-mil 115-mil 135-mil	ASTM D5635	— — —	17.5 22.5 30.0
Puncture Resistance, lbf 100-mil 115-mil 135-mil	FTM 101C Method 2031	350 400 425	450 500 525
Brittleness point, max, °F (°C)	ASTM D2137	-40 (-40)	-50 (-46)
Linear Dimensional Change, %	ASTM D1204	± 1 max	-0.2 typical
Field Seam Strength, lbf/in. (kN/m) ASTM D1876 tested in peel 100-mil 115-mil 135-mil	ASTM D1876	25 (4.4) 25 (4.4) 40 (7.0)	50 (8.8) 60 (10.5) 70 (12.3)
Water Vapor Permeance, perms	ASTM E96 Proc B	—	0.10 max 0.05 typical
Resistance to Microbial Surface Growth, Rating (1 is very poor, 10 is no growth)	ASTM D3274	—	9-10 typical
Properties after heat aging— ASTM D573, 670 hrs. at 240 °F Breaking strength, % retained Elongation reinf. % retained Tearing Strength, % retained Weight Change, %	ASTM D573	— — — —	90 min 90 min 60 min ± 1.0 max
Ozone Resistance 100 pphm, 168 hours	ASTM D1149	No cracks	No cracks
Resistance to Water Absorption After 7 days immersion @ 158°F (70°C) Change in mass, max, % (one side)	ASTM D471	± 3.0	0.90
Resistance to Outdoor (Ultraviolet) Weathering Xenon-Arc, total radiant exposure at 0.70 W/m² irradiance, 80°C black panel temp. 100-mil 115-mil 135-mil	ASTM G155	No cracks No loss of breaking or tearing strength	No cracks No loss of breaking or tearing strength 17,640 kJ/m² 20,160 kJ/m² 27,720 kJ/m²